

CONTROL SYSTEMS HAVING AN ANALOG CONTROL UNIT THAT  
GENERATES AN ANALOG VALUE RESPONSIVE TO A DIGITAL VALUE  
AND HAVING TWICE THE RESOLUTION OF THE LEAST SIGNIFICANT BIT  
OF THE DIGITAL VALUE AND METHODS OF OPERATING THE SAME

**Abstract of the Disclosure**

A control system includes a digital control unit that is configured to generate a digital value responsive to a difference between an output analog value and a reference value. A control signal generating unit is configured to generate a control signal. An analog control unit includes a first circuit that is configured to generate a  
5 first analog value responsive to the digital value and a second circuit that is configured to generate a second analog value responsive to the control signal. The second circuit is configured to generate the second analog value at a resolution that is twice that of a resolution of the first circuit with respect to a least significant bit of the digital value. The analog control unit is configured to combine the first and second analog values to  
10 generate the output analog value.